

Turbine Branch (RTT)

Conducts research and technology developing in turbine aerothermodynamics. Research involves the development, assessment, and application of Computational Fluid Dynamics (CFD) tools and models for turbine aerothermodynamics design and analysis, and the acquisition and analysis of experimental measurements of flow and heat transfer in turbines. The measurements involve both simplified and realistic, complex geometries and are used both for the validation of advanced numerical flow and heat transfer analysis codes and for the development of physical models of aerothermodynamics phenomena. They are obtained in large scale, low speed facilities and full scale, high speed, transonic facilities. The computational emphasis involves the development of advanced computer codes and models, their assessment by comparison with quality data, modification of codes and models to extend range and accuracy, application of codes and models to practical problems to demonstrate their value in design and in providing detailed description of flow field phenomena. The capability of the CFD codes and models to accurately predict losses and heat transfer in 3D viscous steady and unsteady flows is emphasized. Conducts research which involves experiments using advanced instrumentation systems such as laser and hot wire anemometry in order



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to resolve spatial and temporal flow field variations. Major facilities include a full-scale axial flow turbine, a large scale, linear transonic cascade, a small scale linear cascade, a low-speed boundary layer tunnel, a turbine heat transfer lab, and a Forty-Eight Node Compute Cluster.

Synergistically applies experimental and computational efforts to maximize understanding of the complex flows existing in turbines. Applies 3D viscous computational codes and models to both turbine mainstream flows and coolant passage flows with emphasis on prediction of the detailed blade row aerothermodynamics performance.

